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Injuries and Deaths to Children When Left Unattended In or Around Motor Vehicles

National attention concerning motor vehicles (MVs) and child safety has focused largely on protecting children as occupants while being transported in traffic on public roads. However, children who are unattended in or around MVs not in traffic are also at an increased risk of injury and death. Data from two distinct databases were used to examine both nonfatal and fatal non-traffic MV-related incidents. Nationally representative data on nonfatal injuries treated in hospital emergency departments (EDs) were obtained from the National Electronic Injury Surveillance System All Injury Program (NEISS-AIP) (1). Data on fatal injuries occurring across the country were reported from a database developed by KIDS 'N CARS, a program of the non-profit Trauma Foundation. From July 1, 2000 through June 30, 2001, data from these two programs indicated an estimated 9,160 nonfatal injuries and 78 fatal injuries occurred to children aged 14 years and younger when left unattended in and around MVs not in traffic.

NEISS-AIP, operated by the U.S. Consumer Product Safety Commission (CPSC), collects data on about 500,000 cases annually from 65 hospitals that are a nationally representative sample of hospital EDs in the United States. National estimates of nonfatal injuries treated in hospital EDs were calculated by using the sum of sample weights of study cases; weights were derived based on the inverse of the probability of selection; confidence intervals (CIs) were computed using a direct variance estimation procedure (1). Population estimates for computing rates were obtained from the U.S. Bureau of Census.

NEISS-AIP study cases were children treated in a U.S. hospital ED after being injured while left unattended in or around MVs (including cars, trucks, vans and SUVs) not in traffic. These non-traffic injuries included those associated with (1) parked MVs on or off the street and (2) MVs in motion off the street. Children injured during the normal course of getting in or out of stationary MVs were excluded.

NEISS-AIP routinely obtains data on the principal diagnosis, primary body part affected, ED discharge disposition on each nonfatal injury and locale of occurrence (e.g., home or public place). Narratives describing each injury event were used to code surface where incident occurred (e.g., driveway, parking lot, street), and type of event. A classification scheme was developed to categorize cases into the following types of events: run over or backed over by MV; struck by MV; fell out of a MV in motion or fell off of the exterior of the MV (e.g., the bed of a pick-up truck); and other specified (e.g., bumped against MV, dragged by MV, submerged in MV, overheated in MV).

The KIDS 'N CARS database was used to describe incidents involving children who died when unattended in or around MVs. National estimates of fatalities cannot be made from this database. KIDS 'N CARS identifies cases through: 1) online searches of LexisNexis™, a service which provides access to thousands of worldwide newspapers and magazines; 2) keyword searches on the Internet using search engines, the registration of keyword preferences with Internet providers and news media sites, and searches within archives of newspaper websites; 3) news accounts from a clipping service; 4) contacts with child death review teams; and 5) information from an informal nationwide network of professional and personal contacts. Once a case is identified, it is validated using documentation from news media archives and other record sources.

From July 1, 2000 through June 30, 2001, 192 NEISS-AIP study cases were identified representing a national estimate of 9,160 (95% C.I., 5,344 to 12,976) children with nonfatal injuries treated in hospital EDs. Almost 42% of injured children were aged four years or younger and 61.9% were male (Table 1). Injuries occurred predominantly to the head and neck region (30.4%) and the extremities (53.1%). Most injuries were minor contusions and abrasions (56.8%); however, more serious injuries were also

common—26.5% were fractures or internal injuries. Most injured children were treated and released from the ED (81.8%). Most injuries occurred near the home (47.8%) or on public property (31.1%). Injuries occurred in driveways and parking lots in at least 27.3% of incidents (Table 2).

The KIDS 'N CARS database provided information on 78 children who died between July 1, 2000 and June 30, 2001 in 76 separate incidents. Fatal incidents occurred in 28 different states and the District of Columbia. Sixty-four (or 82.1%) of these children were less than 4 years old and 52.6% were male. In 70.5% of cases, the car was located near a home (i.e., driveway, non-paved area near home, street in front of home); in over two-thirds of these incidents, the child lived at that home. The driver was the parent in over half of the 21 cases where a child was backed over.

While 82% of fatal injuries occurred to children less than 4 years old, a majority of nonfatal injuries (69.3%) occurred to children aged 4 years or older (Figure 1). The most common types of fatal incidents were exposure to excess heat inside a MV, being backed over, and being hurt when a child put a MV in motion. The most common types of nonfatal incidents were being struck by a MV, being run over or backed over by a MV or falling out or off a MV. For nonfatal incidents, at least 70% of MVs were moving at a slow speed and at least 20.5% were moving backwards.

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Editorial Note:

This report shows the potential value of characterizing non-traffic-related injuries and deaths to children across the nation using data from federal (NEISS-AIP) and nonfederal (nonconventional, KIDS 'N CARS) data sources. During the one-year study period, an estimated 9,160 children aged 14 years and younger suffered nonfatal injuries and at least 78 lost their lives when left unattended in and around MVs. Most nonfatal injuries were from being struck by a MV, being backed over or run over, or falling from a MV. Most deaths occurred from excessive heat exposure, being backed over, or when a child placed a MV in motion.

Our study findings have some limitations. NEISS-AIP only captures injuries treated in hospital EDs and therefore does not include children seen in physicians' offices and clinics. NEISS-AIP provides statistically valid, national estimates, but is not designed to provide state and local estimates. The types of nonfatal incidents were classified using brief narratives transcribed from medical records; further details about each incident were not available. KIDS 'N CARS data are not population-based and most likely undercount the true number of fatal cases nationally. Media coverage of these incidents may contain incomplete information and be less likely in large urban areas. Furthermore, on-line media archives may exclude very small-circulation local newspapers. Because of these limitations, methods should be explored to obtain routine national data useful for characterizing and monitoring detailed circumstances of injuries and deaths from all types of non-traffic MV-related incidents involving children. The National Highway Traffic Safety Administration (NHTSA) has recognized the need for data on non-traffic MV-related injuries and deaths in children and is conducting studies to assess appropriate methods to identify cases and obtain details about injury-related circumstances (2).

Our findings are supported by other studies that indicate children left unattended in or around MVs are at increased risk for injury and death in incidents that involve parked cars; slow moving MVs; MVs moving backwards in driveways and parking lots;

MVs accidentally set in motion; and trunk entrapment (3-10). In our study, excessive heat exposure while in a MV was the most common cause of death, accounting for 35% of deaths; however, scientific literature on this topic is minimal. Potential interventions and their effectiveness to alleviate these MV-related problems have not been adequately addressed.

Several areas for possible intervention include legislation, regulation, education, and vehicle design. Currently, 11 states have laws related to endangering the life or health of a child by leaving the child unattended in a MV; the nature of these laws and associated penalties vary greatly among these states. In California, 70% of fines resulting from non-compliance with its associated law go to counties to fund public education campaigns to address these preventable deaths and injuries. These laws and associated education campaigns and other possible interventions need to be evaluated for their effectiveness to inform policy makers about their potential to reduce non-traffic MV-related injuries and deaths in children.

Education campaigns aimed at parents and caregivers should include: stressing the need for adequate supervision when children are playing in areas near parked MVs; never leaving children alone in a MV, even when asleep or when restrained; and keeping MVs locked in one's garage or driveway and the keys out of children's reach. Commercially-available vehicle enhancements such as sensing devices that detect unseen obstacles behind the MV and audible signals when the vehicle is in reverse might also help protect children. Efforts should also be made to evaluate the effectiveness of these interventions that might reduce the risk of childhood death and injury in and around MVs not in traffic.

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Table 1. National estimate and rate per 100,000 population of injuries treated in hospital emergency departments for children aged 14 years and younger who were left unattended in or around motor vehicles, United States, July 2000 through June 2001.

Characteristic	National Estimate		Rate (95% CI)
	#	%	
Total Injuries	9,160	100.0	15.6 (9.1,22.1)
Age (in years)			
0-4	3,800	41.5	20.1 (8.5,31.7)
5-14	5,360	58.5	13.5 (8.4, 18.5)
Sex			
Male	5,674	61.9	18.9 (11.0,26.8)
Female	3,486	38.1	12.2 (6.1,18.2)

Table 2. National estimate and percentage of injuries treated in hospital emergency departments for children aged 14 years and younger who were left unattended in or around motor vehicles, by selected characteristics, United States, July 2000 through June 2001.

Characteristic	National Estimate	
	No.	%
Total injuries	9,160	100.0
Primary body part affected		
Head/Neck	2,783	30.4
Extremity	4,860	53.1
Other/ unspecified*	1,517	16.6
Diagnosis		
Contusion/abrasion	5,205	56.8
Fracture	1,212	13.2
Internal injury/concussion*	1,217	13.3
Other	1,526	16.7
Disposition at ED discharge		
Treated & released	7,496	81.8
Hospitalized/transferred*	1,664	18.2
Place of occurrence		
Home ground	4,378	47.8
Public area†	2,852	31.1
Unspecified	1,930	21.1
Surface of occurrence		
Driveway/parking lot	2,495	27.2
Other/unspecified††	6,665	72.8
Type of MV-related event		
Runover by MV	2,767	30.2
Struck by MV	3,414	37.3
Fallout/falloff of a MV	1,705	18.6
Other†††	1,274	13.9

*Estimate may be unstable because the coefficient of variation (CV) was >30%.

†Public area includes school, store, restaurant, park, recreation area, sports arena, and other public place.

††Other includes street

†††Other includes pinned between MV and object, dragged by MV, submerged in water in MV, overheated in MV, and child ran into MV